

Behavior and Intelligence



African Evening

House Sparrow on sidewalk



Swallowtails on beach



BEHAVIOR AND INTELLIGENCE

12

One day in Encino, a male (12 months post-fledging) was foraging with his father underneath a flowering magnolia tree. His sister, a broodmate, flew in and landed in the tree above them, and inadvertently dislodged a flower petal. The petal fell next to the face of her brother, whose head was down. Apparently startled, he jumped backwards. He looked up at his sister and then resumed foraging. His sister looked down at him, turned and inched about 0.6 m along the branch to a flower, plucked off a petal, and inched back until over his head. She leaned forward and dropped the petal, which landed right next to him. Apparently startled again, he jumped backwards, looked up at her looking down at him, and walked out of her range.

– Carolee Caffrey c14

Carolee had watched American Crows for thousands of hours before the above scene unfolded. The sister crow was smart enough to realize the petal scared her brother and took advantage of the situation to have a little fun with him, as our children do with each other. The unexpected makes crow watching so damn much fun. We see ourselves in and through them.

The Society Crow

A Society crow
Once fell in some dust,
And it took all the glow
From her shining bust.

So she told the crows
One awful whopper–
That shiny clothes
For a crow weren't proper.

So the crows grew fussed
And they stood in line
And were rubbed with dust
To remove their shine.

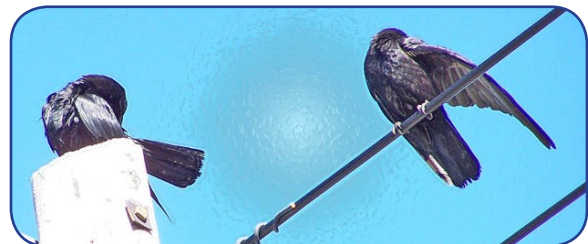
“Now wasn't that silly”,
Said dear little Rose:
“I'll be right down Willie
When I powder my nose.”

– Wilson MacDonald 1930 m06



Preening and bathing

A few of the less common behavioral aspects of a crow's lifestyle are included in this section. As the poem suggests, crows are concerned about their appearance. Preening is a daily activity. Bathing in dust, snow or water is followed by several minutes of preening. A juvenile crow in summer really made the dust fly as it “splashed” vigorously for a few minutes in a windrow of sand along a curb in Guelph **Ontario**. One of the fond memories of Colleen Gerwing (pers. comm. 1988) was watching her pet crow



Preening is a daily activity for American Crows





enjoy a dust bath. In winter snow-bathing can be contagious, with all family members joining it. On a mild winter's day in Guelph, it was raining and snow on the ground was slushy. One American



A breeding crow ruffles its back feathers; late May in **Winnipeg**

Crow of a pair lowered its body and beat its wings in the slush until its feathers were wet. On a colder day, a crow pushed its bill and face into snow, leaving behind a 10 cm imprint in the soft whiteness. Similar moves were recorded by a Hooded Crow in northern **Italy** ¹⁶³. A lone crow in **Guelph** actually ran and dove repeatedly into a snowbank in March. From **Saskatchewan**, a gathering of ravens left marks from their bathing in loose snow ^{25h}. From a roadside in March, I watched crows bathe in icy meltwater in a cornfield. After splashing about, they climbed onto a snowbank behind a tree stump. Sheltered from the wind, they began to preen in the sunshine. Hopkins mentioned crows bathing in snow 8–12 cm deep, with no preening afterwards ^{27h}. Perhaps the feathers have to become wet before preening takes place.

Over the summer, crows bathe in a birdbath, a river's edge, or a shallow, ephemeral puddle after a heavy rain. If you ever raise a young crow, be sure to provide it with fresh water about 5 cm deep for bathing each day. Then sit back and

enjoy the show. Criddle reported that bathing and playing in water were regular pastimes for his pet crows ^{40c}. Anna Leighton (pers. comm. 2011) mentioned her pet crow centered its activity around a water bowl, placing many objects into it. Crows may be as fascinated by water as we are.

What might be called an extreme form of bathing, in this era of extreme sports, was related by Lyanda Haupt on page 65 in her engaging book, *Crow Planet*. She lives in Seattle –

Late this winter, we had the most astonishing hailstorm I have ever witnessed. There was so much hail I could not even see across the street, and it was so loud and beat down so hard that the entire house rattled. I opened the windows of my study and sat up on my desk. To my complete surprise, a crow flew up and landed on the big cypress outside my window. Instead of settling on a sheltered inner branch, this crow chose to perch on an outer branch, one being pelted so hard by hail that it quaked. She shivered her wings and looked up. As the hail beat down on her face, she opened her mouth and sat very still, as if in a contemplative rapture. There she stayed until the hail began to fall more lightly, at which point she brought her head back in line, looked all around at the freshly hailed world, shook out her feathers, and flew to the very top of the Douglas fir down the block, where three other crows appeared to be enjoying the hailstorm. This was all very curious and just like crows, I thought, to revel in hail.

Seventeen species of birds have been reported bathing in snow ^{h73}. One instance was observed by Susan Squires –

Another morning I watched a crow taking a bath but it was in a snow drift. It was towards the last of April and the fields were nearly bare, except where there had been deep drifts and these had melted until they were composed of tiny pellets of ice like hail and were very wet. The crow was stalking around over the bare ground hunting for something edible when an idea struck him. He walked sedately over to one of the mounds of snow, sat down and began to dig a hole with his feet, throwing the wet icy snow up around him. After the hole was deep enough he turned to one side, spread the





A cool bath soaks the feathers. Preening begins in the warm sun and wind

top wing to its fullest extent and began to throw the snow all over his body with his feet just as a hen does in a dust bath. He would also rub his head and neck on the snow at the edge of his “nest.” After a time he got up and reversed his position turning the other side of his body up and repeating the performance. When he was sure he was clean he stood up, shook himself thoroughly, and flew up into a nearby elm tree to dry in the sun.

Bill wiping

This is another daily activity of crows. Usually the bird is perched on a branch and wipes its bill alternately from side to side against the same branch. This preening activity was reviewed for 27 species of passerines. Bill-wiping, although not often discussed in the literature, may be a cleaning, or a displacement activity. It can occur in a wide variety of situations. The frequency and duration are also largely unreported. Because all birds do not bill-wipe (ie. ducks), the habit may be species-specific and useful in some taxonomic studies ^{c71}.

Anting and sunbathing

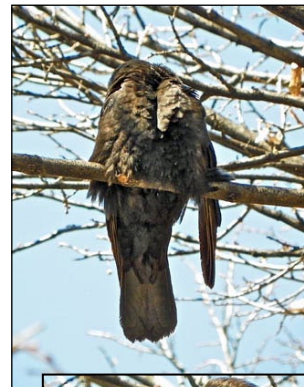
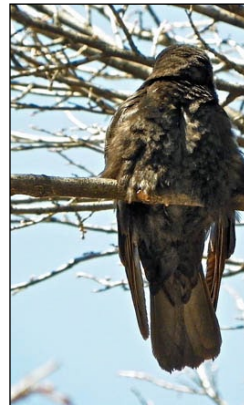
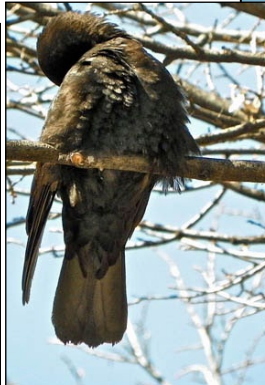
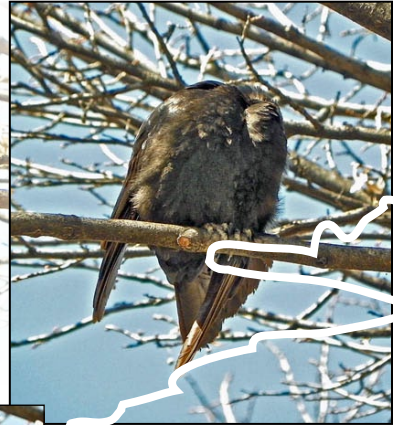
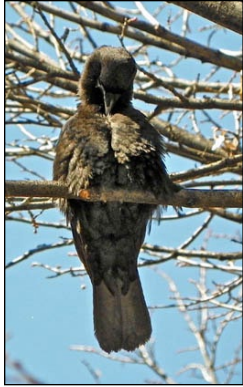
Early information on feather mites came from the Russian parasitologist VB Dubinin. He published 3 volumes on feather mites in 1951, 1953 and 1956. The main food of mites was a lipid substance on feathers, other than that from uropygial gland secretions used in preening. This lipid substance varied in amount throughout the avian year – lowest during molt and winter – highest

after a molt and during the nesting season. The population of mites on a bird also fluctuated – the more lipid substance, the more mites. Working with pipits, Dubinin found a high mortality rate of feather mites after an anting event ^{k27}.

Anting is an unpredictable behavior. It is generously defined as a bird applying foreign substances to its plumage. Most often the substance is living ants. Reports mentioned 24 kinds of ants, as well as over 40 other materials ranging from raw onion to burning matches to tobacco. Anting may be passive – when a bird spreads its wings and tail feathers to let ants walk onto them. Active anting involves a bird using its bill to pick up and place ants among its vanes. Numerous theories to explain anting include ectoparasite removal, attractive odor, sexual stimulation, or chemicals from ants that help to condition the feathers, etc. There are 148 species of birds that ant and not all are passerines. The American and Northwestern Crows are on the list, along with the raven and some European corvids ^{w71}.

In 1980 Hendricks was the first to provide a good description of passive anting in wild American Crows. In **Montana** sunlight, on 11 May, one of a pair of crows settled onto an anthill while the other positioned itself nearby. Even though Hendricks stood only 7 m away and was noticed, the crow continued to ant for 3 minutes as it made guttural calls. Crows do not appear to eat ants while anting ^{h72}. Two pet crows allowed ants to swarm onto their feathers for a few minutes, then ruffled their feathers, picked and discarded the ants ^{w44}. However, too many ants on a crow can become a nuisance. A bird raised by Criddle





Basswood – a place to perch and preen





flew to his arms seeking help. The juvenile crow was covered with ants, which were biting it. The crow remained quiet as he removed them 40c.

A short online video by the BBC Natural History Unit, shows a close up of rapidly moving ants on the feathers of a Carrion Crow. An ant separated two barbs on a black feather. With its mandibles, it grabbed the barb about halfway along its length and raised it until it was sharply bent, or partly broken. The barb remained at an ascending angle when the ant moved on.

It was not until 30 July 1985, during molting, that a crow revealed its anting behavior to me. Less than 20 m away, the crow opened its wings, wiped its bill on the lawn, then with a swift jerky movement, ran its bill several times through the underside of its wings and base of the tail feathers. In less than a minute the active anting was finished. Prior to this rare gesture, the crow remained motionless for five minutes while it faced the late morning sun. When I inspected the spot, nothing remarkable was on the lawn except for a few lively black ants.

An annotated list of papers described anting, etc, by a variety of birds m74. Included was a description of a bout of anting by a tame crow that “deliberately takes his stand upon an ant-mound and permits the ants to crawl over him and carry away troublesome vermin. Ants were seen to seize parasites and bear them away” f64.

Condry described the anting behavior of a human-raised young Carrion Crow not yet big enough to fly. Stepping onto the ant hill, it “went through the motions of flicking the ants onto his back, then slowly settled down among the ants like a brooding hen, with wings outspread and tail fanned.” At another hill, “he would lie flat among the insects, alternately putting ants onto his back with his beak and gobbling ants’ eggs” 05c.

This leads easily and supportively into the conclusions of two women who turned their vision and thoughts to anting behavior. Dismissing the usually speculative reasons already given, the



A pair of breeders near their nest on 10 June 2011 as their fledglings perch in a deciduous tree. Adult on the right turned its head 90° and raised its head feathers as the left toes slid under the wing to give the head / throat region a good scratch

researchers concluded “that sunning and anting are widespread and complementary comfort-motivated behaviours.” Whether the birds decide to sun or ant depended on which set(s) of feathers were molting. In **North Carolina**, August and September were the main months for anting. A heavy rainfall seemed to bring on anting. Dusting and smoke bathing were two possible means by which birds administered heat to their ventral surface p83. Carolee Caffrey and Lawrence Kilham described sunbathing by crows. The birds raised their head-feathers, tilted the head sideways and back, and held this trance-like position for several minutes in full sunshine h63.

A juvenile pet crow of mine almost went too far to get some warmth and smoke. Living in the country decades ago, we regularly burned our waste paper in an outdoor 3-sided brick structure. Attracted by the flame and smoke, the crow spread its wings and walked right up to the burning papers on the ground. The tips of its primaries began to curl from the heat. It may well have caught fire had I not pushed it away with my foot.

Feather lice were gathered for an outdoor experiment in Australia that involved Black Noddies, *Anous minutus*. Noddies regularly sun-bathed at a location on the beach at Heron Island Research Station on the Great Barrier Reef. The longest sun-bathing event lasted 16 minutes. The dark





Keeping cool on a warm day

wings were partially extended as a bird sat on the open ground. For the study, 12 trials were set up. Live chewing lice, *Quadraceps hopkinsi*, were collected from the tips of primary feathers of the noddies, and placed on artificial wings in the sun. These fake wings achieved feather temperatures from 29–72 °C. When the temperatures ranged from 60–65 °C and above, the lice were killed. More noddies sunned in higher, rather than lower temperatures. In the heat, some birds began to pant. Below 29 °C, noddies didn't sun. The greatest number of birds sunned at 36 °C. The maximum temperature of live birds' wings in the sun reached 63 °C 64m. Sunning could make feathers to dry to support a high population of bacteria c79.

Cried. "All good crows
Should learn some game."

But they couldn't agree
Which game was best
Till they found a pill
On the green earth's breast.

Playing

The Golfing Crow

Some crows were poor
And some crows which
Had saved up corn
Were idle and rich.

And these idle crows
With loud acclaim



A pair of fledglings do a little billing





A crow hangs upside down to have a fresh look at its fascinating world

Then they dressed some birds
In caddies' clothes;
But the game of golf
Didn't please the crows.

Till a gay crow saw
One day by a sewer
A half-used bottle
Of Johathan Dewer.

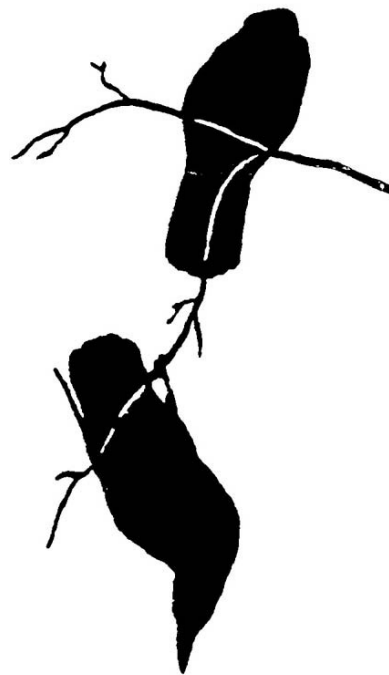
And after one drink
He drove that pill
Far over the brink
Of a three-mile hill.

And it passed on its way
Through a farmer's son;
And the gay crow cried:
"That's a hole in one."

– Wilson MacDonald 1930 m06

In the morning the eastern sky was on fire. Tops of dark billowy clouds burned like candles as they rushed southward. In a matter of minutes the flaming sensation was over. The sun had risen. The fire above echoed the fire below in the young crows as they began to feed and play on a lawn in August. One juvenile crow picked up a plastic straw in its bill. Its peer quickly accepted the invitation, and a short-lived tug-of-war ensued. Carolee Caffrey saw juveniles and sometimes yearlings play with twigs, leaves, bones and other objects, which they carried around in their bills. She also saw more than one tug-of-war develop. Juveniles used a discarded plastic cup to practice log-rolling, and family members chased one crow carrying a flattened pop can. Fledglings and juveniles practiced kicking each other and one jumped on the belly of its playmate v18.

In a playful mood, a pair of juvenile crows in **Guelph** took turns hanging upside down by their feet from a vertical branch a half-meter above the ground. After 10 seconds, the crow on the ground leapt and knocked the hanging bird to the ground. Later that day a crow hung by its feet for 15 secs.



Hanging upside down loosens the restraints of being just another crow in a tree





Common Ravens in Arizona at the canyon

in the middle of a large maple tree. A few times in **Florida**, Kilham watched yearling crows hang upside down and swing from a streamer of the flowering Spanish Moss, *Tillandsia usneoides*, on a tree ^{k48}. Hanging upside down was not always a playful gesture. Near the Hamilton **Ontario** crow roost one morning, crows fed on fruit clusters of Staghorn Sumac in the usual manner. Then one crow decided to hang upside down by one foot. In this position it tore off a chunk of reddish furry fruit. With its bill full, the crow dropped over the edge of the escarpment into flight. Occasionally, at a large roost, the crowded shuffling of American Crows for a perch after dark resulted in a bird being bumped and consequently hanging upside down. One bird at the Hamilton roost stayed that way quietly looking about for 6 minutes until it was dislodged by crows taking off from the branch it was hanging from. At dusk, three pairs of Carrion Crows maneuvered through the trees. One bird landed on a branch and was closely followed by another crow which caused the first bird to slip over into the upside down position. Inverted, it looked around for 3 minutes until it was displaced by another crow ^{m91}.

Ravens take this upside down adventure a step further. According to Elliot, a raven hung from a tree branch by one or two feet, then by its bill for up to 10 seconds. He decided this was part of

the male's courtship performance to impress a female ^{e27}. On the ground, young ravens repeatedly slid on their feet down a shiny 3 m board ^{19c}. Ficken provided other examples of avian play with particular reference to the Common Raven ^{f24}.

Ernest Good related a few instances of crows in "a pure spirit of play." He watched a yearling that picked up and repeatedly dropped a piece of paper in its claws, then rolled onto its back and continued to wrestle with the scrap ^{g34}. At sunrise in Guelph **Ontario**, a juvenile crow carried a discarded cigarette package in its bill. Setting the package down, it rolled onto its back, feet in the air, possibly wanting to play with another crow. Instead, a parent crow stepped on the package, tore it into little pieces with its bill, then walked away (meany). On 30 June 2011, two juveniles, about 3 weeks out of the nest, played with a 4 cm long piece of pencil. One crow tried to get it from the other. One of the crows held the pencil in its bill, then rolled onto its side for several seconds, and used its feet to keep the other bird away. Elsewhere, Good saw crows fly into a strong wind, suddenly flip over and sail in a wild swoop over a field, righting themselves about 800 m away ^{g34}.

Whitford gave a splendid description of a lone crow in **Minnesota** playing in a strong updraft along a bluff in September. As a pilot and ethologist, he watched the crow for 90 minutes as it repeated 25 free-falls, punctuated with a break several minutes long. The bird rose with wobbling wings, then rolled onto its back and with folded wings dove earthward making inverted drops from 20–100 feet (30 m) in length. No other crows or predators interrupted this crow's aerial practice / play maneuvers. The crow seemed to be enjoying itself and often gave "a hoarse, short 'wahh' sound" right before it rolled onto its back ^{w80}.

A crow in **Florida** picked up a 12 cm long stick in its bill, rose in the air, dropped the stick, and caught it in its claws before it landed on the ground ^{k48}. In Encino **California**, a crow carried a stick aloft with its bill or feet, dropped it, then dove after it and grabbed it again in the air with its bill or feet ^{c14}.

There are four types of social play by animals





A breeding crow wets food in the Assiniboine River for its nestlings in early June, 2011

described from our point of view d46 –

- (1) play chasing
- (2) play fighting
- (3) play invitations
- (4) social object play

Corvids and parrots most commonly engaged in social play with play chases and social object manipulation. I suspect that much of the playful antics of juvenile crows in their first summer go unreported due to the shortness of the bouts, and how we define playing among crows. Play appeared to occur in birds with d46 –

- (1) a relatively large brain
- (2) a delay of first time reproduction
- (3) an association of juveniles with parents

American Crows fit all three of our after-the-fact conditions, therefore, they play.

A courage of crows around the world takes time out to play. Their superb civilization permits this little pleasure. A Carrion Crow picked up an object. Rising in a strong wind, the crow transferred the object to its feet, then descended in a “jackknifed” position with its bill pressed against its feet and the object. It took only 50 years of bird watching before McKendry saw a Carrion Crow play in this fashion m94. A Carrion Crow shifted an object about 20 cm long repeatedly between its bill and feet as it flew h48.

Tokyo wakes to nightmare rule of the feathered beasts

by Richard Loyd Parry in Tokyo
Sunday, 28 February 1999

THE INDEPENDENT

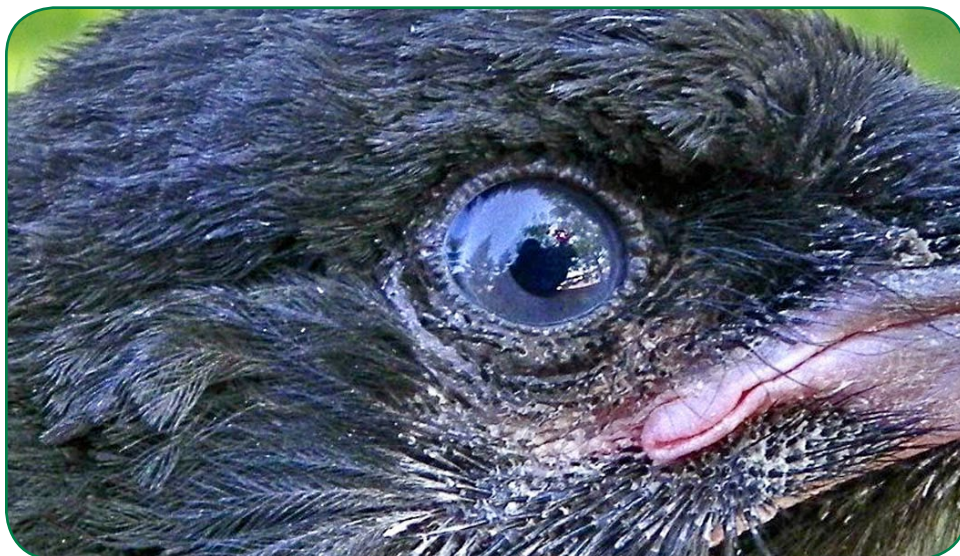
They began their mornings by eating the garbage left out in easily opened bags along the streets of Tokyo, a human problem that Jungle Crows, *Corvus macrorhynchos*, used to their advantage. After their morning's meal, the crows occasionally took time to play. Some of the crows whizzed down slides in playgrounds built for our kids.

“In a letter to the Yomiuri newspaper, one



A young crow jumps from a rock to the lawn





The blue-gray iris of a fledgling

woman described seeing two crows on a wall, moving their heads from side to side with mysterious regularity. Cautiously, she peered over the wall herself – to see a tennis match, which the birds were following, to and fro, as avidly as spectators at Wimbledon.”

On YouTube, 12 January 2012, a Hooded Crow in Russia slid down a snowy roof on a white 10 cm wide lid. It did this twice, and there was one path when the video started, so it was at least a three-peat. The crow kept pounding with its bill at something on the lid. During a slide, the crow flapped its wings for balance. When a slide was done, the crow took the lid in its bill and flew to the top of the roof, where more pecking took place; then another slide. Perhaps the crow was trying to remove something frozen to the lid so it would slide better. Hooded Crows nest in Moscow.

Crows play with other creatures, possibly even people, but we may not know it, or admit it. The tail of a River Otter, *Lutra canadensis*, was pulled by American Crows in **Florida**. Besides having fun, at times the crows in tandem used this tactic to distract the feeding otter and steal its food. Over 12 hours of watching, Kilham and his wife saw crows peck 26 times at an otter's tail, while the mammal was resting or walking to the water k43. Further north, a cemetery in Guelph **Ontario** was the site of a little avian mischief. One

juvenile crow from a family of five began stalking the bushy tail of a feeding Woodchuck, *Marmota monax*. Walking slowly to within a half-meter of its target, the crow then got serious. Bending low, it crept forward. After one or two false jabs with its bill, it connected. Instantly the Woodchuck spun around. Just as quickly the crow jumped backwards about a meter, landing on lawn. As soon as the mammal resumed feeding, the crow again walked towards its tail. The stalk-and-peck game was repeated five times in as many minutes. Finally, the Woodchuck moved away and the crow rejoined its family.

Playing by animals is generally regarded as a universal sign of youthfulness. All this pulling, jumping and hanging by juvenile and yearling crows can, as Kilham and others have suggested, prepare the crow for certain occasions later in life when these stunts may come in handy k50. But when we played, it was usually for the thrill and pleasure of the moment, with little thought to our future. Crows may also enjoy aerial games more than we realize. Performing certain solo moves in the wind, or chasing one another in headlong dives near a roost in the evening could provide the birds with as much delight as it does me to watch them. Kilham watched unmarked yearlings “manipulating objects in a play-like manner.” In **Florida**, crows carried clumps of Spanish moss,





and one piece was used in a tug-of-war between two crows. Perched on a cow's back, a crow pecked at a dry, semi-rotten stick, 11.5 x 2.3 cm, held in its toes. Once the stick fell and was retrieved. The second time the stick was cached. It had no food value, so Kilham thought it was an object used in a playful adventure. He also saw a crow in Florida that appeared to be imitating a pair of dancing Sandhill Cranes by jumping to about 15 cm high and bouncing with open wings k48. At the Florida ranch crows sometimes leapt over animals on the ground; once over a new-born calf and twice over a Turkey Vulture, *Cathartes aura*. In **New Hampshire**, Kilham saw a hand-raised juvenile crow about 5 weeks after fledging, pick up a twig and jump in the air with half-spread wings, turning to one side, then to the

other side k50.

In **Florida**, hen Wild Turkeys became more aggressive than usual in 1984, and chased crows from the kernels of corn Kilham scattered for the birds. Later in the season, he sensed the crows were trying to entice the turkeys to chase them by pretending to be feeding, which always made the turkeys run towards them to get the food. He described a few interactions, including one where a crow was working on a cow pie when a turkey ran toward the crow. The crow, with a piece of the pie in its bill, moved away as the turkey pursued it k58.

In late January 1985, a yearling crow vocalized and flew to within 3 m of a Red-shouldered Hawk perched mid-way in a Red Maple, *Acer rubra*. The crow retreated a few meters in the





tree when the hawk flew at it. This was repeated two more times in 4 minutes. Other family members fed 10–15 m away and paid little attention to this interaction. Kilham had no explanation for this behavior by crows with the turkeys and the hawk ^{k58}. Simply taking time to have a little fun with other creatures is the best explanation I can provide on behalf of the thoughtful crows.

Kilham followed a pair of blackshirts that lost their nest at mid-incubation. The next morning (27 January) he watched her pick up and drop a few sticks, then hang and swing on Spanish moss, which is not easily pulled loose. Crows used pieces of this moss to hold the initial large sticks in place when nest-building began. On 19 February 1983, crows were at a rotting hog carcass when a Black Vulture, *Coragyps atratus*, landed nearby. The vulture began to walk away and one crow jumped over its back several times, perhaps to keep it moving. Then the crow crouched in the grass and gave very loud screams ^{k50}. Sometimes, I think everything a crow does is a form of play. For them, life may be a continuous flow of small, connected adventures.

A crow court

It is not often observed or reported in the ornithological journals. With luck it may be viewed once in a lifetime. Its rarity adds considerably to its mystery. Scattered thinly in the literature, and passed on verbally, the existence of a court held by crows is real in the minds of some, and an unfashionable fiction to those who have not witnessed the event. I believe the crow is the only bird for which a court has been suggested.

A woman with a strong interest in animals told me of her experience. “One I’ll remember the rest of my life,” were her first words. Recalling a summer day in Scotland, when she was going out to tend the cows, she noticed a group of 12 crows in a circle, surrounding what appeared to be an injured crow. Each crow in turn advanced a few steps, gave some movement and talk, then returned to the perimeter. As she walked closer, all the crows flew to nearby trees, leaving the outcome in doubt. In the field, two men picked up a badly injured crow in **Massachusetts** one May. It had apparently been mobbed by other crows

and left for dead. “Tried and condemned, and assaulted in earnest” its right tarsus and left wing were broken, its spirit gone. It awaited death ^{b04}.

At Cape Breton **Nova Scotia**, MacLean was walking with a couple of birders in May. Hearing crows calling in the distance, they investigated and found crows were killing another crow. She

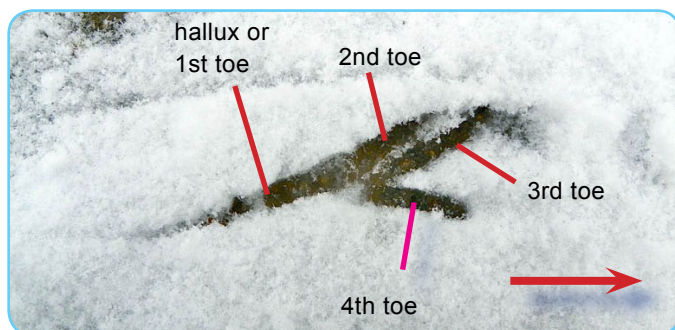


Above the entrance of a tipi

had no explanation for this behavior ^{m11}. The spring dates for the above events suggest the killings might somehow be involved with the breeding season.

In the 1920s, Taber quoted a article in the *Atlantic Monthly* which made known – “A colony of rooks, perhaps the most intelligent of the crow tribe, was recently observed sitting in solemn conclave, like the Church authorities round the Jackdaw of Rheims, about the person of one of their numbers. Their notes rose and fell with that harsh variation that always suggests conversation and debate. It continued for a while, when the assembled judges and juries suddenly fell upon the delinquent and put him to death. Why was he killed, what incident had preceded, the observer did not know; but of the deliberate killing, preceded-





American Crow tracks in 1–2 cm deep wet snow on a sidewalk, 16 April 2011, **Winnipeg**. Right foot, about 8 cm long by about 3.5 cm wide; crow moving to the right

ed by a period of debate, there seemed to be no doubt” t01.

A rare event was witness in the Olympic National Park **Washington** on 9 July 2001. At about 9 o'clock in the morning, 15 Northwestern Crows were making a lot of noise in the forest about 30 m from the beach. The crows mobbed another crow perched on a limb about 3 m above the ground. Soon one crow made contact with the perched crow being mobbed, and the two birds fell to the ground. The mobbing continued. The crow under attack was on the ground on its back, wings spread, feet in the air with a large cut on its right leg. After 30 minutes, the crow on the ground was dead and the body cavity empty. The mob of crows either ate parts of the dead crow, or moved the parts away from the carcass. It appeared to be a yearling or adult crow that was mobbed to

death a33.

Whatever the reasons, were these actions the outcome of a crow court? Had the accused been found guilty, and then executed according to laws of the crow's culture? The existence of a court raises a few profound questions about crows.

Walking, perching, flying

To continue my behavioral analysis of this great bird, I divided its daily regime into three broad categories – walking, perching and flying. Sleeping is covered in the chapter on roosting.

Walking

On the evening of 15 April 2011 in Winnipeg, **Manitoba**, it started to snow. The next morning, the sidewalk was covered with 1–2 cm of wet snow, I located a couple of relatively straight sections of tracks made by crows. The average distance between 27 normal steps was 16.8 (16.5–17.1) cm. The imprints were about 8 cm long by 3.2–3.8 cm wide. The distance from one left print to the next left print was about 30 cm. The 1st toe or hallux pointed straight back and aligned best with the 2nd or inner forward pointing toe. The back toe was visibly dragged through shallow snow. As the toes were raised, the central

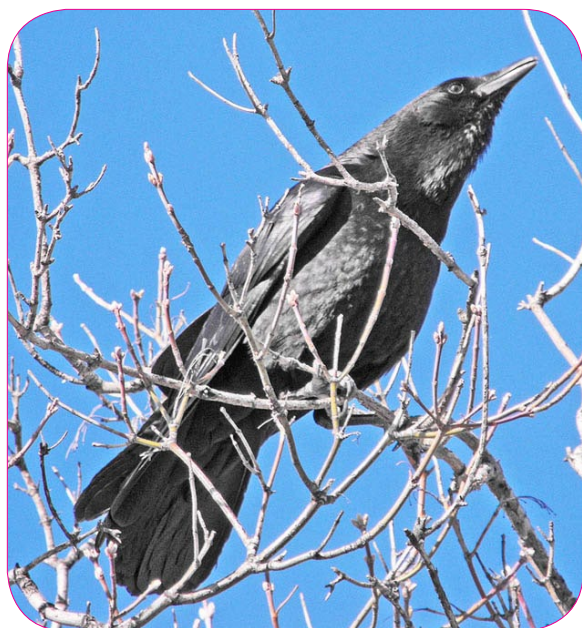


American Crow tracks average about 17 cm apart, L–R–L–R in 1–2 cm deep wet snow on a sidewalk. Distances between 2 right prints was from 23–32 cm; walking to the right, 16 April 2011, **Winnipeg**





longest toe (3rd), was also dragged through the snow for a much longer distance, at times it overlapped the drag mark left from the movement of the back toe. The two inner toes, the 2nd and 3rd digits, were parallel and very close to each



other and pointed slightly inward in relation to the axis of the direction of walking. The outer 4th toe pointed out and away from the axis of walking. Walking in a meandering line, an adult crow took about three steps in a second, which gave it a walking speed of almost 0.8 km per hour. The entire footprint pointed slightly inward in relation to

the direction of travel. By the time this angle was transmitted back to the tail, the rectrices swung back-and-forth with a metronomic beat that is best appreciated from the rear.

When in a hurry to catch something, a quick series of several hops, each one covering about 50 cm, is used by a crow. One foot hits the ground slightly ahead of, and earlier than the trailing foot^{h47}. Large nestlings hop from branch to branch to nest shortly before they fledge. From my observations I believe juvenile crows are more inclined to hop than are adults. Crows do not always walk forward to get where they want to go. I have watched a crow take several steps backward to avoid a confrontation with another family member. Sometimes a crow walks or shuffles sideways. Eight such prints in the snow covered 38 cm. When a pair of crows were perched on a horizontal limb, and one of them wanted to be nearer the other, whether for affection, allopreening, or to force it to retreat, a sideways shuffle was employed. In 70 km gusts of wind, crows walked sideways on a lawn to remain facing the wind. As Townsend^{t67} and I have noticed, when a flying crow landed on the ground, depending on its speed, it could take one hop forward (up to about 30 cm long) with both feet, before it started to walk.

When walking, crows move their heads back-and-forth. This motion may be correlated to the horizontal body posture, seeing ability, balance and habitat^{d01}. A couple of researchers analyzed the movements of two corvids – the



Crow going away





American Crow and the Western Scrub Jay, *Apelocoma californica* near **Los Angeles**. In particular, they measured the configuration of the corvids' visual fields and the amount of eye and head movements in relation to foraging and anti-predator behaviors. When their eyes were at rest, both species could see the tip of their bill, but the crow had a larger binocular field of view with an average width of 23° . This assisted the crow in its feeding behaviour and manipulation of objects. The average width of the blind area was narrower in the crow at 8° versus 24° for the jay. The span of eye movement was 16° in the crow, more than twice that of the jay. When crows diverged their eyes, the width of the binocular area decreased by 88% and a 4° blind area developed at the front of the bill ^{f20}. From photographs or through binoculars, it is possible to see the eye of the crow rotate slightly, as it is raised at the back, to improve and increase the amount of forward vision at the bill's tip.

Perching

Continuing with this crow / jay study – head movements varied when the birds were on the ground or perched. On the ground, jays moved their heads more quickly than did the crows. When perched, the opposite was observed. The tiny interval between consecutive head movements for jays had a duration of 807 milliseconds (a millisecond = one thousandth of a second). Since crows tended to perch on the top branches of

trees, or atop an antenna, the higher rate of head movement probably allowed them to gather more information. When a crow walked and hopped, it moved its head 24 times per minute, and the interval duration between consecutive head movements was 943 ms, or almost one second ^{f20}.

Above ground level, adult crows may perch as high as 22 stories atop office towers in cities. When a TV aerial or ladder projects above the roof, the birds perch on it. I have never seen a crow walk under or perch on a parked car. Many years ago in Kenora **Ontario**, I was amused in the winter by Common Ravens strutting atop parked cars in town.

CROWS

Are jokers escaped from a batman movie
You can tell by their eyes
Their brains are full of holy flavors
Twig legs made for the dance macabre
Twirling round the road kill
Jerky gestures
Miners of pungent death
Badge carriers from the other kingdom

– David Scott 2010





Flying

By all accounts, crows are aerial performers. An American Crow weighing 550 g is borne aloft on a wing area of 1,344 cm², which explains their wondrous abilities in the thin medium p79. I have watched them hover for several seconds, float backwards on open wings above trees at a large wintry roost, momentarily flip upside down, glide for half a kilometer or more, and go into long twisting dives near a roost or evening assembly in which their speed may exceed 100 kph. Normal flying speed was –

(1) 40–50 km / hour r16, or 48 km / hour 24c



(2) an average speed of 26 mph (41 kph) within a range of 17–35 mph (27–55 kph) from 15 observations 88b

(3) flying, the heart rate was 10 beats / sec. b94

At the winter roost in **Hamilton**, I met an older man who equated the flight of a crow with that of “a piece of tarpaper in the wind.” Although he meant it in a derogatory manner, I found his description quite picturesque. He thought the flight of pink flamingoes was so much more proper for a bird. Normally, a crow’s regular wing beat is slightly too quick for me to follow. With a more acute vision, Blake placed their normal wing beat at 2.2 (1.4–2.8) flaps per second in level flight,



A Black Crow keeps its neighborhood / territory a little cleaner. Photographs © George Veltchev from Randburg, Johannesburg, South Africa, with permission





Saskatoon – a raceme of white flowers

and 2.7 (2.4–3.1) flaps per second when climbing 25b. A thorough description of the crow's wing muscles, complete with superb drawings, is provided by Hudson and Lanzillotti 51h. On **pages 494–496** a few of their drawings are reproduced in the chapter on Anatomy.

Considering the thousands of crows I have watched flying, only two have I seen scratching their heads in the air. Because it happened unexpectedly and lasted but a moment, I am not certain if their leg passed over or under a wing. Kilham saw crows reach forward under a wing to scratch when flying k63. A Rook scratched its head directly in flight without lowering its wing to

accommodate the leg s83.

Both flying crows I saw scratching were about 30 m distance and going away from me. One bird quickly lost altitude while head-scratching; the other did not. When perched, the wing is lowered and the crow scratches its head by reaching over the wing with its toes. If scratching near its eyes, the whitish membrane is closed. Passerines in flight carry their feet in front with the toes in a fist so they can easily reach ahead and grab a perch when landing t69. When taking off, a crow's legs hang and are brought up slowly to the belly with the toes in a fist against the feathers. The tarsi lean forward and are visible in flight.

A wind tunnel was used to measure the energy cost of sustained flight of Fish Crows (mean 275 g) and a Laughing Gull (277 g). Both species weighed the same, but varied in wing characteristics. The crow had an aspect ratio (length to width) of 5.2, and the gull's ratio was 9.3, indicating a longer and narrower wing. The wing span of the crow was 56 cm; that of the gull 78 cm. Trained to fly in a wind tunnel, the crow at level flight ranged from 7.4–11 m per second (27–40 kph), and used 5.2 wing beats per second. The gull used 3.9 beats per second.

Level flight by the crow cost about 1/3 more energy than the same flight for the gull. For a crow to travel 1 km, the lowest energy input occurred if the crow flew at top speed. Crows in the wild rarely do this. At an air speed of 11 m per second (40 km per hour), the minimum cost of travel was 8 joules per gram per km. At a weight of 275 g, and a conversion rate of 8 joules = 1.9 calories, a Fish Crow used 525 calories to fly one km. In comparison a 275 g mammal on the run used 18 joules per g per km, or slightly more than twice the energy of a flying Fish Crow b97.



Moss on the ground





A few years later, the same researcher looked at the temperature of a flying Fish Crow in a wind tunnel. Ventilation during indoor flight was 8–14 times greater than for a crow at rest. The energy cost of indoor flight was about 7 times that at rest. Therefore, heat production in flight was about 5 times above that when resting. Some of the heat was lost through respiratory evaporation, convection, and radiation. Crows flying in the wild would be much more efficient at heat dissipation by non-evaporative means in order to keep cool ^{b99}.

I keep the rustic gate closed
For fear somebody might step
On the green moss.

– Lu Yu ^{r47}

Aggression

Casual observations lead us to believe crows were rather benign, pacific creatures. Day by day this is generally true. However, when aggression is necessary, vocalization and flight pathways solve most episodes. Physical contact is rarely observed. But special conditions bring out the bird in crows. Fights over food seemed inevitable, but Kilham did not observe any. “Whatever a crow caught, it kept, regardless of its social status” Crows, as Kilham observed, suppressed the possibility of robbery by a walk or flight from their family group when a choice morsel such as a fresh dead bird, frog, or an apple was obtained. Sometimes a crow with food was briefly chased ^{k48}. A few incidents of in-family aggression came to my attention among the crows in Guelph **Ontario**. One juvenile in July was very possessive over a small log on the ground. It resented the approach of other family members. When a peer arrived for a closer look, it was knocked onto its back. When the juvenile finally moved away from the log, I walked over for a look. Swarming ants were on the wood.

More than once I have watched a juvenile crow lose its patience with a parent’s slowness when feeding it a worm. The juvenile chased after the dangling worm in a parent’s bill as the adult



pirouetted through a full circle. When a juvenile crow crept forward and “stole” a remaining bit of food from under its parent’s bill, the parent did not respond aggressively toward the juvenile. Parents may eat part of a worm, then walk away from the rest, leaving it on the lawn for a nearby juvenile to



The blue shadows on the snow from an American Elm recreate the outlines of moving floes of ice in the nearby Assiniboine River





learn to eat on its own.

One summery afternoon near the 50-yard line of the University of Guelph's football field, three juveniles surrounded one parent on the grass. Their constant begging annoyed the parent to such an extent it held one of them off with its foot pressed against the juvenile's side. Then, in two separate instances, the parent grabbed the tip of a juvenile's wing in its bill and pulled back with enough force to cause the young crow to lose its balance. The next minute the tail feathers were pulled. Then the parent's bill was used in an intimidating way. Turning quickly through a half circle, the adult swung and aimed its bill at its young. It worked, the juveniles backed off. Harmony was restored when the young crows went on a prolonged chase of each other toward the end zone. Kilham watched two crows lie on their sides, grabbing at each other with their feet. One crow actually stood on the belly of another crow ^{k63}.

On 18 May, a lone American Crow flew at two Double-crested Cormorants on the 300 m wide Fox River. The crow forced one flying cormorant to dive into the water, and another that surfaced to submerge when the crow approach it. The author suggested the crow may have been aggressively defending its territory ^{c94}. In my opinion, it may have been playing with the 2 cormorants to see how they reacted to its approach.

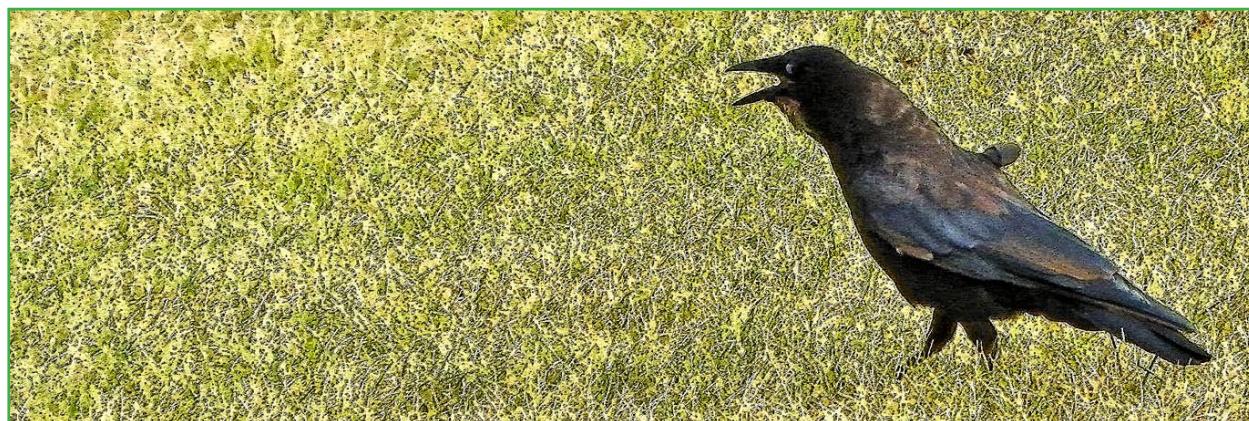
With crows it is hard to tell the difference, from our standpoint, what sort of behaviour is aggression, and which is play, when other species are involved. For example, at a Greater Prairie-chicken, *Tympanuchus cupido*, lek in Lyon County **Kansas**, crows and Prairie-chickens became involved. In the first case, on 22 March, one

crow landed in the center of the lek and called for about 15 minutes before it flew away. The male prairie-chickens did not resume their displays until 10 minutes after the crow left. Then on 26 March, one crow arrived at the lek followed by a second crow a minute later. One of the crows flew at two male prairie-chickens causing them to flush. The crow flew after them for 300 m before it returned to the lek. After a few more chases and calling, the 2 crows left. The prairie-chickens returned to the lek, but did not display normally the rest of the morning. The three observers thought this might have been a playful episode by the crows ^{f47}. I agree. Crows have a lot of fun for a bird.

Intelligence

“**A** delicate empiricism is required to see comprehensively rather than selectively and to think not about crows but with them. The biggest hindrance to an alternate way of thinking is the false assumption that nature and culture are separate ontological entities. Crows in their relationship to humans offer a compelling narrative to ponder the need to reevaluate the presumptions that animals are without history or culture” ^{g03}.

Examples of a crow's intelligence, cleverness or high adaptability come solely from our insular viewpoint. How a crow thinks of its own intelligence may be as ill-conceived as how we think of our own. Here is one definition, “Tools are traditionally defined as objects that are used as an extension of the body and held directly in the hand or mouth. By these standards, a vulture





Dead crow in tree

breaking an egg by hitting it with a stone uses a tool, but a gull dropping an egg on a rock does not.” The vulture is a true tool-user, the gull is a borderline (proto-tool) tool-user 130.

Reviewing the literature – “the relative size of the neostriatum and whole brain distinguish the true and borderline categories in birds using tools to obtain food or water.” The neostriatum is an area in the “avian telencephalon thought to be equivalent to the mammalian neocortex.” It seems that “birds are more frequent tool users than usually thought and that the complex cognitive processes involved in tool use may have repeatedly co-evolved with large brains in several orders of birds.” In the Carrion Crow in Europe, “the neostriatum / hyperstriatum ventrale complex is 5.5 times larger than it is in the quail 130.”

The American Crow is a species with the most observed techniques 130 –

- (1) uses stone hammers to open acorns
- (2) sharpens a piece of wood to probe a hole
- (3) drops palm fruit and nuts on asphalt roads
- (4) batters fish on hard sand (also scaling fish on sand by scraping it)
- (5) when caged, uses a scoop to carry water to dry food

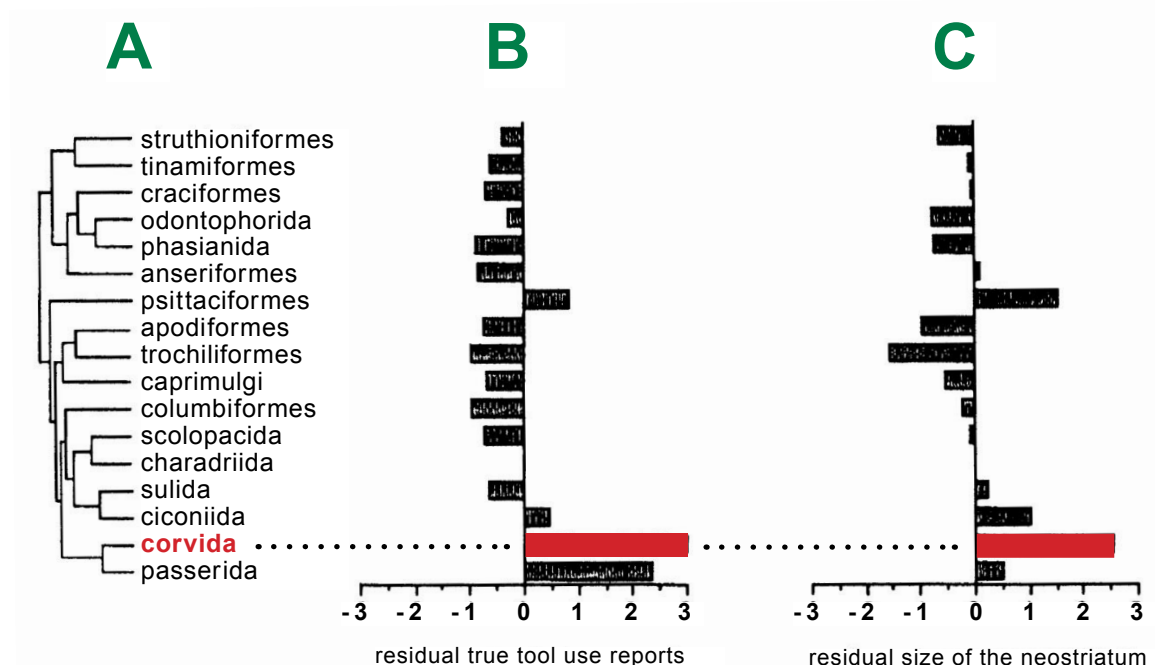
Emery and Clayton – “There are many aspects of corvid and ape cognition that appear to use the same cognitive tool kit: causal reasoning, flexibility, imagination, and prospection [foresight]. Cognition in corvids and apes must have evolved through a process of divergent brain evolution with convergent mental evolution” e33.

Marzluff and his group devised a wonderful visual experiment between us and the crows near Seattle **Washington**. A person banding crows wore a mask that represented either a dangerous looking face or a neutral face. Up to 3 years later, the person again wearing the dangerous looking mask was scolded when walking in a crowd of people by the crows she handled / banded. People who wore a neutral mask during banding were ignored in a crowd by the banded crows. This revelation was shown on TV in 2011, and had numerous people again talking about the intelligence and perceptions of the American Crow. Crows could recognize individual people with different walking gaits, sizes, ages, and sex. It may be that local birds exposed to certain negative threats or experiences, learned to avoid certain people. And it only took one instance for the crows to learn what the person looked like. Even wearing a dangerous-looking mask upside down didn't fool a crow. A crow looked at the mask, then turned its head 180° to see the mask / face in its normal orientation. Recognition of humans by crows ensures the continuing coevolution of both cultures m56.

In **Guelph** and **Winnipeg**, all I had to do was stand close to a nest tree that I had visited a few times during a nesting survey, and the crows would call aggressively and occasionally fly within a few meters of my head. It didn't matter what I was wearing or carrying. They watched me as intently as I watched them, and probably in a detailed way unlike my weak visual process.

From field and laboratory observations, it was clear the crow, with its 9 gram brain, was attentive and thoughtful of the world around it q04. In late June two adults and one juvenile were feeding on a lawn in Guelph **Ontario**. The juvenile, about 20





536. (A) Phyletic tree of the 17 taxa for which telencephalic areas of the forebrain are available; branch lengths are proportional to DNA hybridisation distances given in Sibley & Ahlquist 1991 s80. (B) Residual true tool use reports per taxon. (C) Residual size of the neostriatum. NOTE: Corvida is not a distinct clade (a group of closest relatives) but an evolutionary grade, in the modern usage, © Yale University Press

days out of the nest, flew with one parent to a small deciduous maple tree. With the juvenile perched a meter overhead in full view, the adult began tugging at a bare branch for four minutes. With wing flapping and hard work, the crow finally broke off the branch. The bird maneuvered the twig in its bill and flew to an adjacent tree. Then, in imitation, the juvenile crow began to tug lightly on a branch. Was this a lesson by the parent on how to gather material for a nest? Since I was familiar with this family, in the past the parents did not allow their young to remain as helpers. By the end of September the parents had usually disassociated themselves from their young. Lessons, therefore, had to be given in the short time available over the summer, when they were together.

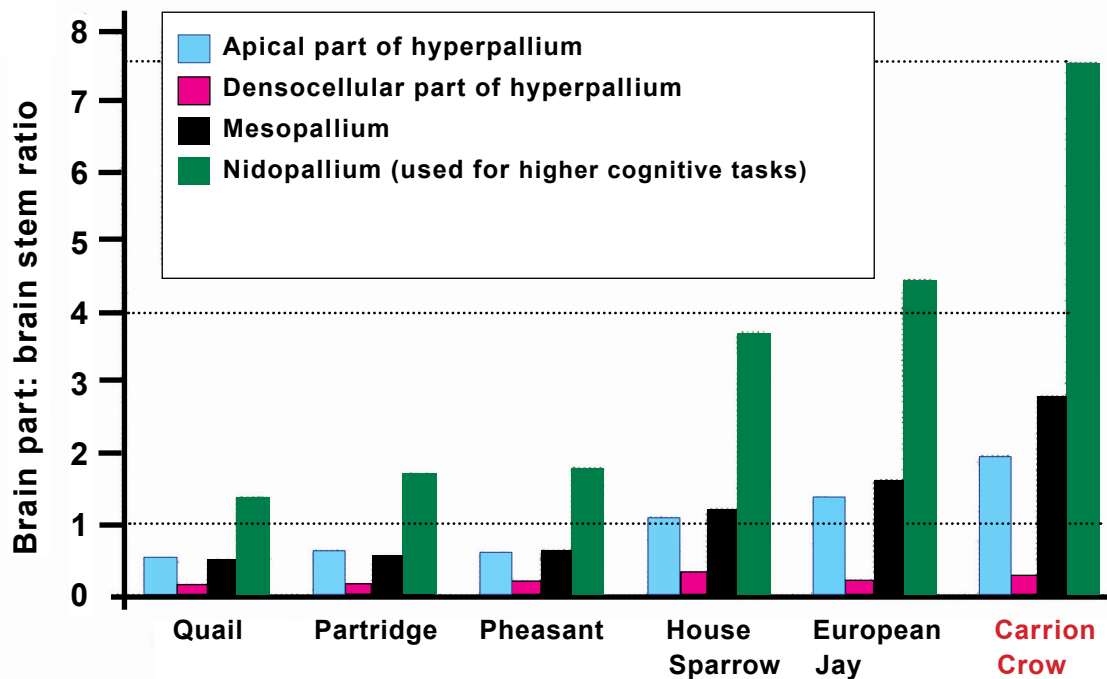
Crows are tool-users. Adelaide King saw a Northwestern Crow use its bill to pry a peanut stuck in a crack. Having no success, it took a small stick and worked the peanut back-and-forth in the crack until it came out j25. In residential Stillwater **Oklahoma**, Caffrey watched an American Crow probe a hole in a wooden fence with

its bill. It then pecked at the fence and tore off a triangular 4 cm long piece. Holding the piece with its foot, it pecked at the tapered end, narrowing (pointing) it in the process. Holding the wide end in its bill, it again probed the hole for about 20 seconds. The crow then left, but not before placing the piece of wood into the hole. In the hole Caffrey found a large spider c12. Near Alamo **Texas**, a family of Green Jays, *Cyanocorax yncas*, used a twig several times to get at insects under the bark of a tree g12.

Wars for instance, rock concerts.
That's why crows are studying us,
To find out why we watch pictures of other people copulating,
Why we stick bayonets into one another
Or walk about in public with things stuck in our ears.

– David Scott 2010





537. The apical part of the hyperpallium, mesopallium, and especially the nidopallium are relatively larger in passerines and particularly in the corvids (Eurasian Jay and Carrion Crow) than in the other 4 species r35, © 1991 S. Karger AG

New Caledonian Crow

The New Caledonian Crow, *Corvus moneduloides*, resides on islands off the eastern shore of **Australia**. Hunt ^{63h} described how the bird created and used tools. The crows' gadgets included two types of a hooked tool to capture prey. It also made a stepped-cut barbed pandanus leaf. Tools by these crows had properties that indicated –

- (1) a high degree of standardization
- (2) the use of hooks
- (3) distinct tool types with constraints of shape

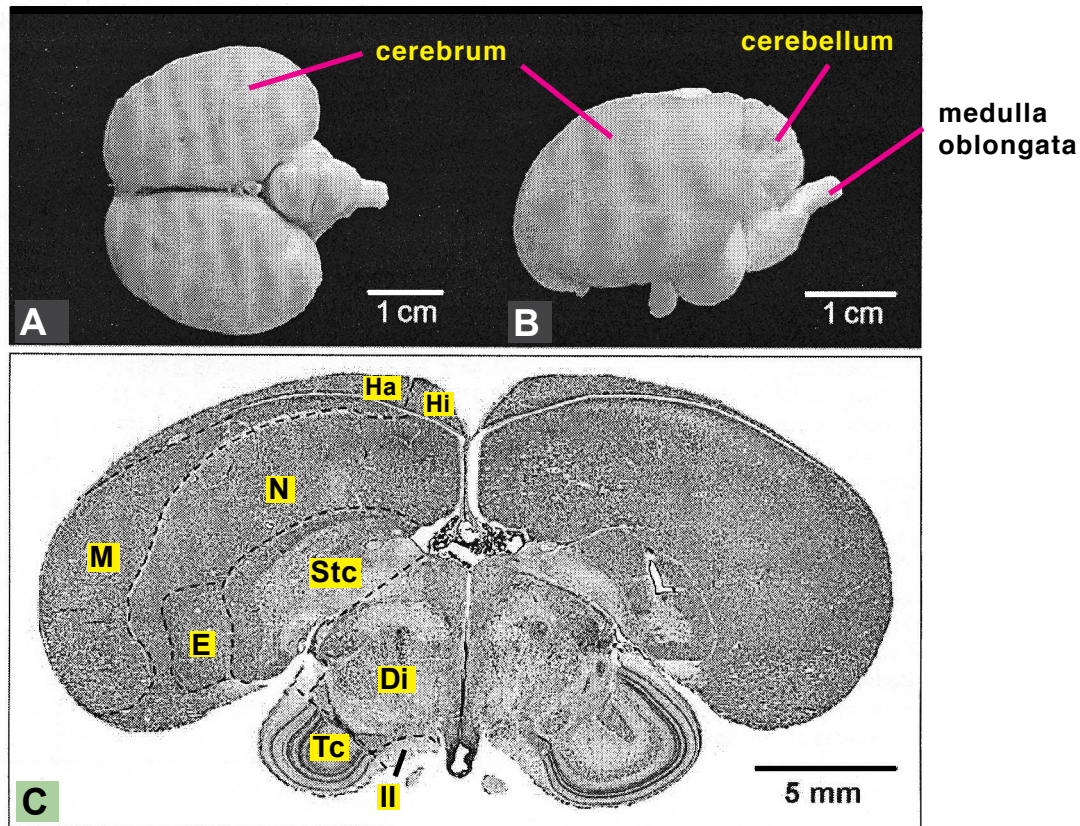
Later, Hunt and others suggested birds from different localities exhibited a right- or left-handedness when manufacturing tools from narrow leaves, a trait previously thought to belong only to humans ^{66h}. In the wild, crows probed under bark and into a hollow branch using a 10 cm long twig held in their bills. A crow manipulated the twig for 10 minutes, working it up-and-down, but not actually getting any food with it. A foraging attempt was the most likely explanation. They wondered

why the crows, which feed on such a variety of food items, developed such a selective feeding procedure. But then, considering how inquisitive crows can be, and with time on their side, tool-usage seems natural ^{o20}.

The standard trap-tube paradigm, and the trap-table task were used to find out if the NC Crows used causal reasoning to solve physical problems. Six wild crows were tested on the island of Maré, **New Caledonia**. Three of the six crows solved the trap-tube and the trap-table by recognizing the significance of the hole. This suggests that causal reasoning on the object-hole interactions from gravity was a component of the New Caledonian Crows' cognition ^{t15}.

Staying with New Caledonian Crows (which looks similar to American Crows but weigh quite a bit less), a video on the web shows Betty bending a straight piece of wire at one end which she then used to hook a small bucket with food at the base of a clear vertical tube. She pulled the bucket up and out of the tube, set it down, then ate the contents. Other instances of tool creation and use by members of this species have been described





538. New Caledonian Crow The brain. (A) Dorsal view (B) Lateral view (C) Coronal section with some subdivisions: Di = diencephalon, E = entopallium, Ha = hyperpallium apicale, Hi = hippocampus, M = mesopallium, N = nidopallium, Stc = striatopallidal complex, Tc = tectum opticum, II = tractus opticus 11m, © 2010 S Karger AG

s30. After watching the video of Betty you will be forced to adjust your ideas on intelligence in humans and especially in other animals. Using motion-triggered video cameras at seven feeding (larva-fishing sites), it was discovered that young New Caledonian Crows took more time and were less successful than adults in obtaining food with their tools. Compared to the surrounding materials at the feeding sites, the crows showed they were selective in the materials they chose to make their tools in the wild 28b.

A comparison was done on the brains of four passerines –

- 5 New Caledonian Crows (NC Crow)
- 5 Carrion Crows
- 2 European Jays, *Garrulus glandarius*
- 4 House Sparrows

The total brain volume and volumes of 15 distinct areas were determined. Brain size / body weight relationships were compared. In the NC Crows, (average weight 277 grams with a total brain volume of 7,295 mm³), four brain areas were enlarged, compared to the other 3 passerines in the study. The four areas – mesopallium, pallidostriatal complex, septum and tegmentum are involved with “associative and motor-related structures in the forebrain.” The “mesopallial size predicts innovative and flexible behavior generally in birds. Tool manufacture and use in NC Crows is not part of a rigid motor program, but comes from a flexible cognitive ability that makes these birds the most proficient non-human tool manufacturers” 11m.

Visit the web page newsblog for Scientific American titled, **Rooks make hooks (and other**





tools) in labs, but not in wild by Katherine Harmon, 26 May 2009, 03:35 PM. It contains a short, video of a Rook that, like Betty above, retrieved a small pot of food from the bottom of a clear vertical cylinder in a laboratory, after it quickly formed a hook at one end of a straight wire that it then used as a suitable tool. The Rook, *Corvus frugilegus*, went about this exercise with obvious energy. It wasn't mentioned if this was the first time this captive Rook created the hooked tool from the wire.

It was suggested endocranial volumes of vertebral skulls provided a reasonable estimate of brain size. Problems arose from age variations. Skulls from adult specimens were used from 4 museums in Australia and Canada. Lead shot was poured into the endocranial cavity, then poured into modified syringes to determine the volume. American Crows had –

Brain–mass (n 1)

(1) body mass 337 g

(2) brain mass 9.3 g

Endocranial–volume

(1) body mass 438 (n 10)

(2) endocranial volume 7.2 ml

The endocranial volumes can be transformed into grams by using the density value of fresh brain tissue, 1.036 g / ml, to make a reasonable estimate ⁱ¹⁴. The Carrion Crow, which is similar to the American Crow, had an average weight of 467 grams, and a total brain volume of 9.6 mm³ ^{11m}.

An American Crow in **New Brunswick** was raised by a student and studied for 6 years. Although alone, Loki “spontaneously developed 5 kinds of tool use involving 5 different objects.” It appeared that social learning, involving movement imitation, did not contribute to the development of any of Loki’s use of tools. His use of tools developed slowly over 5–16 months, indicating a lack of insightful or cognitive

explanations. The uses were modifications of “species-typical crow behaviors.” His use of tools were not always for the acquisition of food, but simply for play. This habit of playing lasted for several years ^{c96}.

Although the use of a tool to obtain food would seem to be the most desirable reason, a young Rook easily inserted a plug into the right hole in the floor of an aviary which caused a pool of water to form. The captive Rooks used the water for drinking and bathing. This use was most apparent on hot and dry days, even though fresh water was available for drinking and at times for bathing ^{r36}.

the most interesting question arising from all of these observations is, how many birds in a population are smart enough to react to a novel situation with a new approach? And once the new approach was perfected, how was this information passed through the population? Like people, some corvids are naturally smarter than others of their species. Bierens de Hann, working with Goldfinches, found genuine insight was part of the learning process for some of them ^{t49}. In another experiment, one of three White-necked Ravens showed apparent insight in





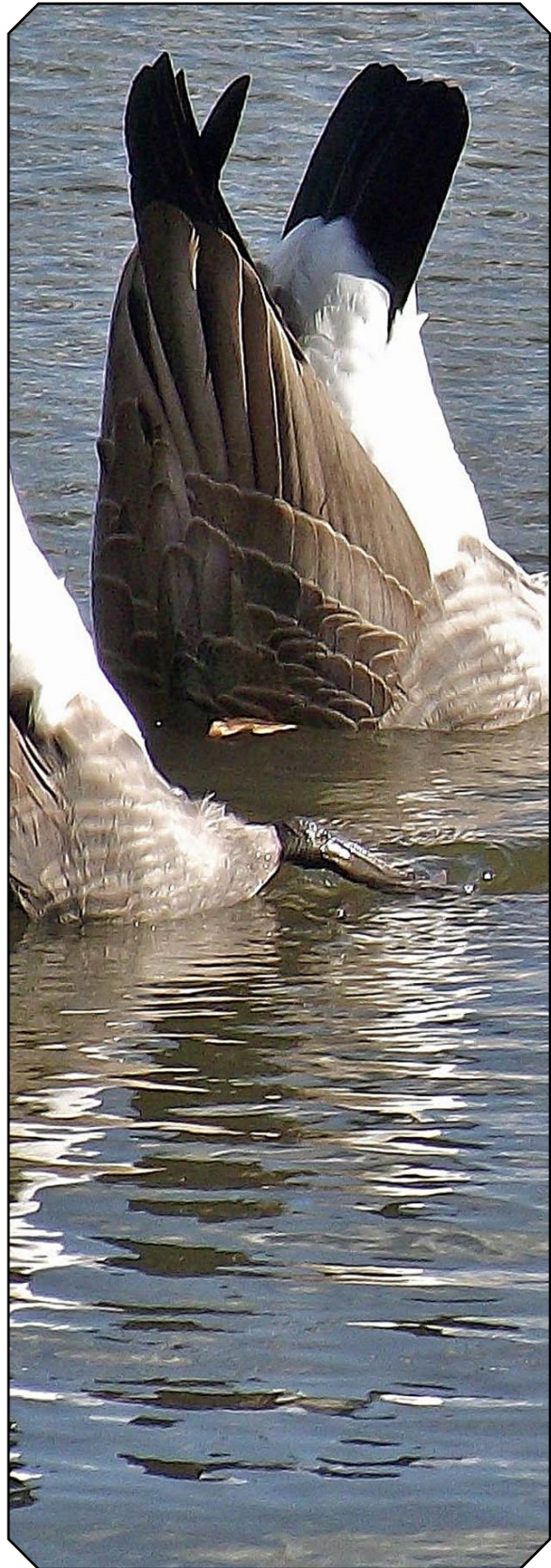
learning to discriminate a 1 versus 2 concept. At day 5 in the experiment, one raven suddenly shot up to a 90% accuracy level. The other two ravens slowly rose to a 67% and 76% level by day nine 98s.

In Algonquin Provincial Park **Ontario**, Waite tested semi-tame, banded Gray Jays on their decision-making in relation to collecting food for storage. Using three paired choices of varying amounts of food placed at varying distances in tubes, the jays did not respond in a logical, transitive manner predicted by standard theories of rational choice for optimal foraging strategies. Their subjective evaluation of each situation indicated their options were not fixed. The jays were not hip to our principle of strong stochastic transitivity. The jays' adaptive choices, based on a complex decision process, lead to intransitive preferences w04.

Marzluff and Angell described the cultural coevolution between crows and us. It developed because crows and humans are both social creatures capable of continuous learning. Coevolution was possible when animals were long-lived, smart, and mingled with people. By living in cities, crows have learned to include foodstuffs such as french fries, pizza and processed meats into a natural diet of insects, mice, worms, and road kills. In turn, our culture created icons such as scarecrows, and explored our relationship with these birds through art, writing, and music. Each culture stimulated the other culture to grow along new and fascinating avenues m53.

Indoor and outdoor experiments, although quite technical, gave more information into the thinking and response abilities of crows. Right from the start, it would be difficult to design an experiment that incorporated elements meaningful to the crow or any bird, as it "tried" to solve a problem imposed upon it by an academic human mind. The bird chosen as a representative of Aves, has traditionally been the Domestic Pigeon, a bird which on the basis of comparative brain development is ranked quite low c90. A smarter bird that would reflect an increased learning capacity would be the crow 43s. But tradition is hard to change in the scientific community.

Two researchers tested habit reversal and found crows showed a drop in errors right from





the start. This response was “superior” to that of the pigeon and rat. When juvenile American Crows were subjected to object-discrimination learning set acquisition, they showed minimal improvement in performance across problem blocks. This was less than that for the Blue Jay ^{69h}.

Under time-based schedules of reinforcement, American Crows were superior to pigeons. Operant conditioning, which ties a response (pecking) to an immediate release of food, was studied for three American Crows. They were trained to key-peck for food as a reinforcement under 4 intermittent schedules of time – fixed ratio, variable ratio, fixed interval and variable interval. The crows maintained a consistent response as schedule requirements were extended. The crows developed similar response patterns during the same schedule of reinforcement. Behavior of the crows was similar to that of the pigeon’s ^{p86}.

The results of several more laboratory experiments were too technical for me. I apologize for passing over this section of crow research. For those who are interested, see the additional references for Powell and others ^{p94}.

The Carrion Crow and Common Raven were tested in time-related tasks, specifically, a delay of gratification. A bird’s decision to wait depended on the time required to obtain the reward and the quality of the reward. To kill time, corvids placed the reward on the ground, or even stored it. A wait, up to slightly over five minutes, was the maximum delay. This behavior was comparable to that in primates ^{d67}. ■



American Crows have yet to tell us which god they invented

